

Soils

The intent of this section is to report if the alternatives comply with relevant laws, regulations, policies, and plans. Many proposed activities will be implemented with heavy machinery use, although other activities that could impact soil are also considered. This soils analysis focuses on erosion and other detrimental soil impacts.

Desired Condition

The desired condition is for all activity areas to be left in a conditions that are capable of vegetative growth, water infiltration and stable mineral soils. These desired conditions will be accomplished by maintaining less than 20% detrimental soil conditions (DSCs) impacts on the Umatilla NF. Detrimental impacts include erosion, compaction, puddling, displacement, and detrimental burning. Detrimental soil impacts are at a practical minimum.

Methodologies and Assumptions

The project categories are restoration oriented projects that may take place across the Umatilla NF. All projects have specific BMPs to minimize the risk of elevated erosion, puddling, rutting and compaction. Erosion will be the resource indicator for this analysis and other detrimental soil impacts including compaction, puddling, and displacement.

- The basis of the effects analysis is the observations and professional judgment of the project soil scientist developed through 18 years of observation of Forest Service projects.
- This section concerns only soil outside of stream channels. See the Hydrology and Fisheries sections for discussions of conditions within stream channels.

Spatial and Temporal Context for Effects Analysis

The spatial boundaries for analyzing the cumulative effects on soil are within 50 feet of the stream channel, except the boundaries would extend further when and where heavy machinery goes further from the stream channel. These boundaries were chosen because they include the area where effects (direct and indirect) may be caused by the proposed activities (FSH.1909.15, 15.2a).

Relevant Laws, Regulations, Policies, Guidance and Plans

- Land and Resource Management Plans - The Forest Plans (1990) Umatilla Forest-Wide Standard & Guidelines applies to use of heavy machinery.
- National Forest Management Act - If a project meets Forest Plan Standards, it would meet the requirements of the National Forest Management Act and other laws and regulations (FSM R-6 Supplement 2500-98-1).
- Compliance with the Umatilla National Forest Land and Resource Management Plans and Other Relevant Laws, Regulations, Policies and Plans - all alternatives comply with relevant laws, regulations, policies, and the Forest Plans as disclosed in the Effects sections.

Affected Environment

Erosion

Soils in riparian areas are highly variable with few soil characteristics as a consistent. Most of the topography in these areas can be variable. Often the soils were deposited on floodplains (especially soil near streams), since soil loss into streams is not limited to any particular particle size. This variety of soil textures found in streams on the Umatilla NF. This variety of soil textures will lead to a similar variety of infiltration rates in stream soils. Where silts and clays are present, erosion that may lead to elevated sediment with human activity. However, provided appropriate erosion control has been put into place, soil loss and sedimentation can be mitigated largely. The primary constant for riparian areas is the availability of moisture making plant response and growth a fast recovery option for disturbance in these areas. In these areas ground cover tends to be abundant, because the relatively high amounts of water supports abundant plant growth. Additionally, the abundant vegetation makes riparian area soils more resilient for recovering from human activities, except roads.

Roads are the main activity causing accelerated out-of-channel erosion. Also, some accelerated erosion takes place on dry non-forest areas in riparian areas impacted by livestock, and also livestock trailing. Off highway vehicles may cause out-of-channel erosion, but no case of this erosion has been reported to the soil scientist. Accelerated erosion in the analysis area from human activity is low, except from managed and unmanaged roads. And much of the sediment from erosion is deposited on soil before it reaches a stream channel, though some sediment does reach stream channels from roads.

Other Detrimental Impacts

The same soil moisture that produces abundant plant growth in riparian areas also makes the soils relatively susceptible to other detrimental soil impacts - compaction, puddling, and displacement. The amount of these impacts, as well as detrimental burning in riparian areas, is variable.

Some causes of high impacts near streams include past concentrated railroad logging, agricultural use prior to becoming part of the National Forest system, livestock concentration, and some dispersed camping. Off highway vehicles may cause compaction, but the only observed case of soil impacts related to them was on tracks created along fences, which likely exist for fence maintenance and may also get use by antler hunters.

About 10% of upland areas of the forest have relatively high impacts to soil. The impacts mostly result from heavy equipment use during past logging and fuels control. In regard to areas within 50 feet of streams, there are probably fewer instances of relatively heavy impacts than in upland areas (fewer than 10%) because of protective measures taken during past activities.

Environmental Consequences

Alternative 1 – No Action

No additional detrimental soil impacts would result from increasing the pace of aquatic restoration activities. Additionally, no reduction of existing Detrimental Soil Conditions DSCs (i.e. Compaction, and/or Displacement) would occur. Locations left in these detrimental states would continue to have reduced vegetative growth. Another factor of these detrimental conditions is lowered infiltration, this will also induce diminished vegetative growth. With diminished infiltration comes an elevated risk of erosion, with surface run-off or RHCA sites, this condition may lead to chronic erosion conditions.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Erosion

Some activities are expected to *never* increase out-of-channel erosion. They are: riparian vegetative planting; bull trout protection; and surveys in support of aquatic restoration. These activities do not use heavy machinery or otherwise remove ground cover or cause water concentration.

Most of the other activities may use heavy machinery. Erosion from heavy machinery use would be minimized by General Aquatic Conservation Measures as well as PDCs (see appendix A) and by minimizing compaction and puddling, and thus rutting.

Livestock stream crossings and off-channel watering facilities, road and juniper removal would be minimized by PDCs (appendix A). It is possible that juniper removal would increase ground cover within a few years, and thereby reduce erosion.

Prescribed (controlled) burning (including for disposal of slash after juniper removal) can involve only low and moderate severity fire, and erosion from fire lines would be minimized, so erosion from prescribed burning would not be significant. Erosion would be at a maximum during activities, and would decrease to zero by about three years as erosion control measures take effect.

The road and trail erosion control restoration category would reduce areas of chronic erosion by improving drainage and stabilizing road surfaces. Relocating roads out of riparian areas would reduce sediment routing to streams. Reducing fire risk through controlled burning would also reduce the probability of erosion from wildfire.

As noted in the existing condition section, most soils in analysis area tend to have low erodibility. This low erosion is mostly a combination of amounts of effective ground cover and the low precipitation in the analysis area. Because erosion would be kept to a minimum, and because of the low erodibility of most soils, erosion is not expected to significantly affect soil productivity or to introduce a significant amount of sediment from outside channels into channels.

Other Detrimental Impacts

Implementation of the restoration activities utilizing heavy equipment may create areas of compaction, puddling, and displacement. These impacts would be minimized by General Aquatic Conservation Measures. They would also be minimized by project design criteria that minimize erosion (see project design criteria by resource listed in appendix A).

Upland timber sales during dry periods detrimentally impact about 10% of an area. Factors that are different for aquatic restoration are as follows:

- Soils in aquatic restoration would typically be moister, and therefore more compactable.
- Machinery in aquatic restoration is not limited to skid trails, and therefore may affect a larger proportion of the area. On the other hand it is possible aquatic restoration machinery would affect a smaller proportion of the area, because the machinery needs to reach fewer points. Additionally equipment commonly used (excavators) have the ability to rehabilitate their travel corridors, therefore detrimental impacts can be restored before equipment leaves the site.
- The area impacted by aquatic restoration machinery would be impacted less, because there would be fewer passes, and the machinery may have less ground pressure than logging machinery.

Consideration of these factors suggests that aquatic restoration machinery would detrimentally impact about 4% of the activity area. Depending upon equipment used, it may be possible to leave less than 1% of the area with a detrimental soil impact. The potential for reducing detrimental soil impacts to this level is if preexisting impacts are restored when found within a planned restoration project with the available equipment.

None of the activities are likely to detrimentally burn soil, because any prescribed (controlled) burning would be kept to low or moderate severity.

Cumulative Effects

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects

Past actions that may affect erosion and other detrimental impacts, which are not happening presently, include roads, extensive logging, and in a very few areas, range. Past, present, and reasonably foreseeable activities or actions include livestock management, camping, use of off-road vehicles, and limited logging in riparian areas.

Conditions resulting from foreseeable actions are expected to be similar to current conditions. Some soil would recover from past and present actions, but this recovery would be offset by new impacts from foreseeable actions.

The effects of past and present actions were described previously under Existing Condition in this section. The effects of the proposed activities would add to the effects of the past, present, and reasonably foreseeable actions.

Erosion

The main past, present, and foreseeable future sources of out-of-channel erosion are roads. The expected increase in out-of-channel erosion from the proposed activities is small, and when added to erosion from roads, is not expected to be measurably greater than erosion from roads alone.

Other Detrimental Impacts

Detrimental impacts from this project add to past and present impacts. Detrimental impacts are expected to be minimal, and overlap of project effects in time and space would be rare. Cumulative impacts are averted by the project design criteria developed for the soils resource (see **Error! Reference source not found.**).

Summary

All alternatives comply with relevant laws, regulations, and policies, and the Forest Plans as disclosed in the effects section. None of the effects are significant.